Providing Health Checkups Through Schools: An Evaluation of Coverage in Bihar's School Health Program

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Introduction

- Governments of many countries increasingly turning to schools to deliver essential health services to children, due to failure of local health institutions to attract households.
  - Only 28% of children between the ages of 0 and 5 avail of Government programs for health and nutrition provided through village Anganwadi (day care) centers
- Delivery through schools may be more effective because of near universal enrollments in primary schools
- Solution advocated by researchers (Jamison et al 2006), but also by international institutions (FRESH, Focusing research on Effective School Health, inter-agency framework of UNESCO, UNICEF, WHO and World Bank).

Yet, coverage achieved by health programs run through schools is also very low

- Example, Government of Bihar's school health checkup program, *NPSGY.*
  - In first year (2011-12) only 43.6% of targeted 34 million children were covered.
  - In 3 districts of the state, coverage was less than 10%
  - In an additional 6, coverage was between 10% and 30%
- Low coverage widely attributed to high rates of student absenteeism- 40%
- Seems obvious: If a student is not there, cannot be covered under the program
- Aggregating up, expect schools with high overall absenteeism to record lower-than-average coverage under the program.
- Govts have prioritized policies to improve attendance, not just for their effect on delivery of services through schools, but also (primarily) because of effect on learning

But, could improvements in attendance have a negative effect?

- Data reveal that some districts with better functioning schools, and higher attendance, do *worse* in terms of coverage under *NPSGY*

- And, coverage rates in most districts are significantly *lower* than attendance rates

This paper explores an alternative explanation

- Low coverage primarily reflects resource constraints (number of beneficiaries to be covered per medical team) that are adversely affected by *higher* attendance
  - Higher attendance on the day of the program *lowers* the probability that any individual student will receive a checkup.
- Opposite effects of a student's *individual* probability of attendance (positive) and that of aggregate attendance (negative).
- Provide empirical support for this hypothesis, in the context of Bihar's *NPSGY*

This paper establishes

- Effect of individual attendance on coverage
- Effect of aggregate attendance
- Provides additional evidence on resource constraints
- Examines reverse causation: Effect of coverage on individual attendance probabilities

Results

- Individual attendance enhances coverage
- Aggregate high attendance *reduces* coverage
  - Paradoxical result: Need to improve attendance to achieve coverage goals, but, doing so, without increasing health resources, will reduce coverage
- No effect of program on attendance, except in smallest schools

Rest of the talk

- NPSGY
- Resource constraints in health centers and schools
- Survey region, data and summary statistics
- Empirical Methodology
- Results
- Conclusion

2. NPSGY

- Teams organized from PHC, including doctors, specialists, but also people from lower health institutions, ANM, AWW
- Work through all schools in the PHC, so variation in month of visit, even within the block
- To ensure attendance, information on health camp was to be disseminated through AWW, ANM
- Evidence of resource constraint even in planning, in that each school was allotted one day (rather than varying with school enrollment)

Table 2: Microplan for *NPSGY*, district Kishanganj, block: Bahadurganj (PHC: Bahadurganj) – avge 370 children per day, 1.14 minutes per child

HSC	Number of schools			Camp date (2011)	Number of beneficiaries
	Primary	Middle	AWCs		
Rupni APHC	5	3	8	11/5 - 16/5	2455
Nisandra	5	3	8	17/5 – 20/5	2036
Loucha & Bisa Gopalganj	8	6	19	21/5 – 28/5	4137
Mahadev Deghi	7	5	10	30/5 – 8/6	3300
Dohar Malani	6	2	9	9/6 – 14/6	2160
Palasmani Birpur	6	3	9	15/6 – 20/6	2508
Bansbari	7	4	8	21/6 – 28/6	2552
Murmala	7	2	8	29/6 – 5/7	2220
Khodaganj	10	6	10	6/7 – 18/7	4105
Natuapara	3	2	10	19/7 – 23/7	1921
Lohagara	17	5	17	25/7 – 30/7	5335
Dohamani	6	2	8	6/8 - 13/8	2358
Sameshwar	3	3	5	16/8 – 20/8	1590
Bilasi	2	2	5	22/8 – 24/8	1168
Jhingakata	9	3	10	26/8 – 2/9	2538
Gangi	4	2	7	3/9 – 10/9	2962
Altabari	3	1	8	12/9 – 16/9	2264
Gopalpur	6	1	7	17/9 - 24/9	2026
TOTAL	123	57	206	11/5 – 24/9	50,635

Additional evidence on role of resource constraints by examining effect on coverage of programs that compete for resources: VHSND

- Central Govt program introduced under NRHM
- In Bihar, also introduced in 2011-12
- Run by AWC, but planned at the level of the HSC
- Fixed dates set aside at HSC for VHSND – generally Mondays and Fridays, but additional days, depending on number
- Have exact days, for each HSC, set aside for VHSND, from micro-plans, so index of whether VHSND is on same *date*

3. Resource constraints – Health institutions

- Population per HSC (Bihar): 24,600 (national norm: 5000/3000)
- Population per PHC: 158,275 (national norm: 30,000/20,000)
  – APHCs 61,000 (norm: 30,000)
- Norm for PHC staff strength: 13 (1 dr., 1LHW, 1MHW, 3 ANMs,…)
  - Bihar falls short, eg., only 28% of PHCs have a LHW

Resource constraints - schools

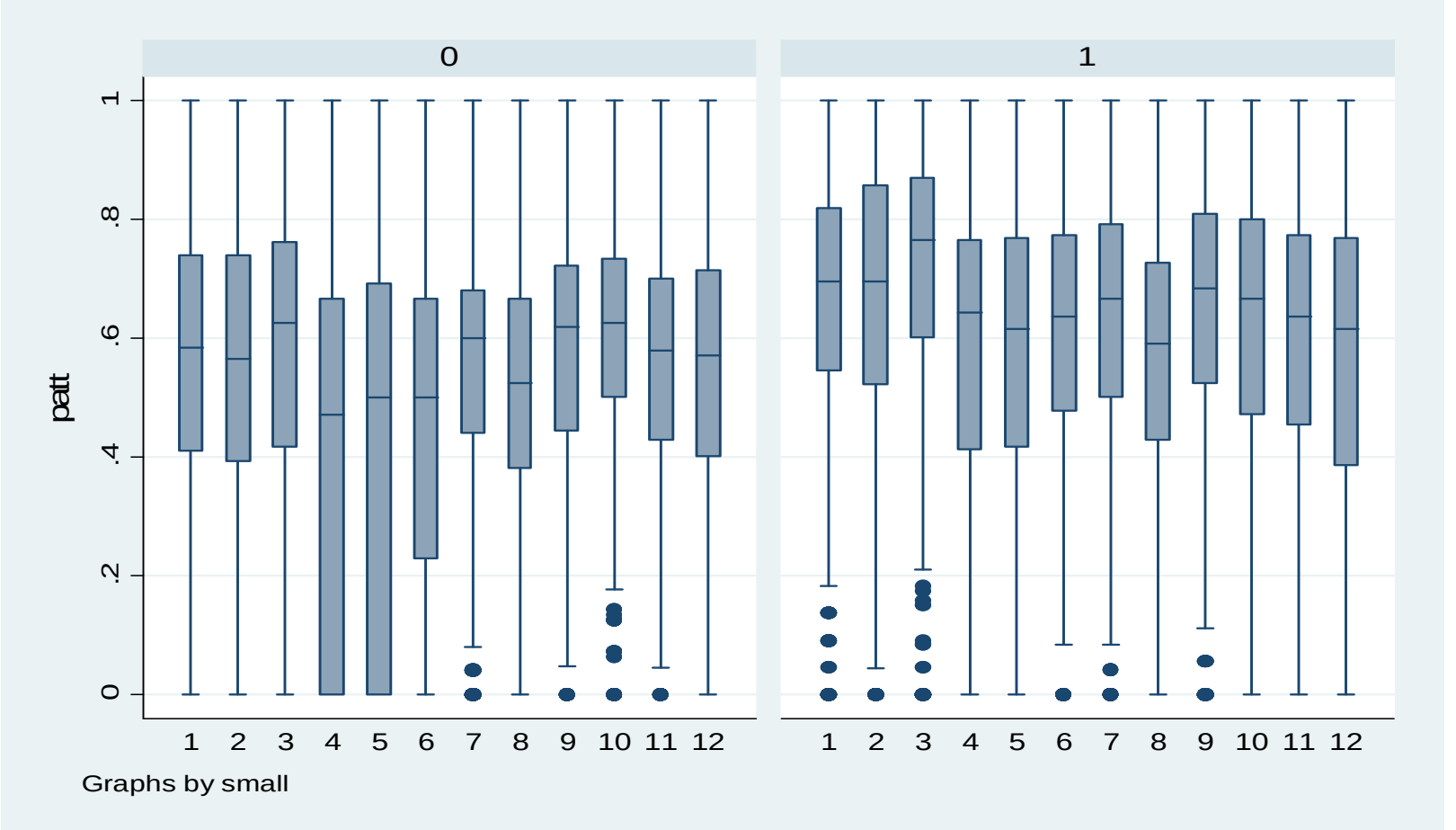
- Even with contract teachers, state PTR is 52 in primary schools, 65 in upper primary
  - India (Primary): 33
  - Karnataka: 16
  - Maharashtra: 23
  - UP: 41
- Reflects variation in school size
  - Bihar (183 (primary) – 452 (HPS))
  - India (95 – 166)
  - UP (154/117); Karnataka (39/171); Maharashtra (58/186)

4. Survey Region, Data

- 4 PHCs, 6 HSCs, 32 schools
- Attendance data on all students in grade 2 (2011-12), as well as data on their attendance in the previous year
- HSC data, school data
- Districts: Vaishali and Buxar
- Summary statistics in paper

Attendance

- Very low: 57%; monthly variation; by school size



6. Empirical Methodology

- Theoretical framework: resource constraints, that limit the time available for each school, and hence the number of students who can be seen by the health team.

- Number of students that can be seen in a day is not assumed to be fixed, since team can choose amount of time to spend on a student

- If number covered increases with number of students in attendance, but at a decreasing rate, then individual probabilities of coverage fall with increases in aggregate attendance rate.

- Other determinants of individual coverage probabilities:
  - Individual probability of attendance
  - Factors determining length of time of school visit (distance from PHC, HSC, but also quality of school management as reflected in school size, number of teachers)
  - Other factors that determine time spent per student, such as socio-economic background of students (proportion SC/ST)
  - Individual attributes of children (caste, gender) may influence individual coverage probabilities

Estimating equations

- *Coverage:* Health personnel (resources) determined annually, so *coverage* reflects school (S), PHC (P) and student (X) fixed factors (over school year), and monthly variation in aggregate attendance

- *Attendance* includes month-specific (X) hhold variables as well as factors common to all households but varying by month (Z)

- $$C_{ijp} = \alpha_0 + \alpha_1 \Pr(attend)_{ijv_j} + \alpha_2 \bar{A}_{jpv_j} + P_p^{0\prime}\alpha_3 + X_i^{0\prime}\alpha_4 + S_j^{0\prime}\alpha_5 + u_{ispv_j}$$

- $$\Pr(attend)_{ijv_j} = \beta_0 + \beta_1 E\left(C_{ijp}\right) + \beta_2 X_{iv_j} + \beta_3 Z_{v_j} + X_i^{0\prime}\beta_4 + S_j^{0\prime}\beta_5 + \varepsilon_{ispv_j}$$

Empirical challenges: reverse causation, omitted variables bias

- Exploit variation in visit day, even across schools within a block (PHC).
- Use knowledge of exact visit date, combined with monthly data on attendance.
- Construct a pseudo-panel data set using monthly observations
  - Far more observations per student
  - No problem of attrition bias, etc.

Instruments for aggregate attendance

(in grade 2 – identify common component for all grades)

- Monthly variation in school days, in month of visit
- Variation in month of school visit implies variation in this variable, even within a block (include block dummy variables)
- Exogenous choice of date of visit (regression evidence in paper, though only 36 schools)
- But, doesn't explain variation in attendance across schools within a HSC
- Interaction with school size

Identification of individual attendance

- $$A_{v_j-1} - A_{v_{j-2}} = \beta_2 \left(X_{iv_j-1} - X_{iv_j-2}\right) + \beta_3 \left(Z_{v_j-1} - Z_{v_j-2}\right) + \left(\varepsilon_{iv_j-1} - \varepsilon_{iv_j-2}\right)$$

- Reverse causation bias: removed, because attendance in other months not affected by coverage

- Omitted variable bias removed by differencing, which implies that instrument is uncorrelated with any (unobserved) fixed factors determining coverage

- Lagged and forward difference terms

- Key to identification: high frequency of data, relative to planning period for health institutions, schools: most determinants of coverage are fixed over the course of the school year.

Testing Reverse Causation: Effect of coverage on attendance

- Difference-in-difference estimator
- Observations: student–month attendance
- Indicator variable for whether health camp in that month (varies across schools)
- Month-level dummy variables included, enabled by data on students in two years
- So, difference by month of visit, comparing those with visits in that month versus those without

Table : Effect of attendance on coverage (with first stage regressions)

	First Stage Regressions – probability of attendance, visit month		IV Probit, Dep variable: Coverage
	Individual	School avge	
School days, visit month	-0.02* (0.01)	-0.03* (0.002)	--
School days * school size	0.01* (0.001)	0.01* (0.0005)	--
$(A_{i,t-1} - A_{i,t-2})$	0.12* (0.02)	0.015 (0.009)	--
$(A_{i,t+2} - A_{i,t+1})$	-0.19* (0.03)	-0.02+ (0.012)	--
$(A_{t+3} - A_{t+2})$	-0.14* (0.03)	-0.04* (0.01)	
Individual Proportion attendance, visit month	--	--	2.84* (0.71)
School proportion attendance, visit month	--	--	-6.84* (1.36)
Wald test of exogeneity $\chi^2(2)$	--	--	32.39 (0.00)
F test for significance of instruments	37.82 (0.00)	65.56 (0.00)	--

Omitting Effects of aggregate or individual attendance probabilities

	IV Probit, Dependent variable: Coverage	
	Regression 1	Regression 2
Individual Proportion attendance, visit month	0.08 (0.59)	--
School proportion attendance, visit month	--	-2.78* (0.84)
Male	0.04 (0.07)	0.07 (0.07)
SC/ST	0.26* (0.09)	0.20* (0.09)
School size (in hundreds)	-0.09* (0.03)	-0.22* (0.04)
School proportion SC/ST	-1.51* (0.42)	-1.17* (0.43)
Teachers	0.17* (0.02)	0.20* (0.02)
Distance HSC	-0.10* (0.03)	-0.07* (0.03)
Wald χ^2	135.42 (0.00)	147.93 (0.00)
Wald test of exogeneity $\chi^2(2)$	1.59 (0.21)	13.61 (0.00)

Other specifications

- Include effect of VHSND: negative effect on coverage, supporting role of resource constraints
- Address concern of invalid instruments (school days) because of other omitted visit month specific determinants of coverage (weather, etc), by including dummy variables for visit month – no significant effect on either individual probability of attendance or aggregate probability
- Results also unaffected by standard sensitivity tests on set of regressors

Table 14: Regression estimates of the effect of the program on attendance

Variable	2011-2012 sample only		2010-11 and 2011-12 sample	
	Regression 1	Regression 2	Regression 3	Regression 4
Year 2 (2011-12)	-0.01* (0.005)	-0.06* (0.01)	-0.20* (0.01)	-0.20* (0.01)
Visit month * year 2	--	0.91* (0.23)	-0.02* (0.01)	0.05* (0.02)
Visit month * school size * year 2	--	-0.01 (0.01)	--	-1.25* (0.22)
Visit month * SC/ST * year 2	--	--	--	-0.01 (0.02)
Visit month * year 1	--	--	0.03* (0.01)	0.002 (0.02)
Visit month* school size (in hundreds)	--	--	--	0.004 (0.003)
Visit month * SC/ST	--	--	--	0.02 (0.014)

Conclusions

- Fundamental constraint on effective delivery of services, health personnel, cannot be reduced by shifting delivery from local health institutions to schools

- A general finding, that also applies to schools:

  - Unless improvements in enrollment / attendance are matched by increased investment in teachers, any increase in enrollment / attendance can only mean a reduction in learning

    - Explains why, despite measures to improve attendance, learning has not significantly improved in recent years

  - Inequality: In schools with poor attendance (large schools), students who attend benefit from aggregate absenteeism – higher inequality in poorer quality schools